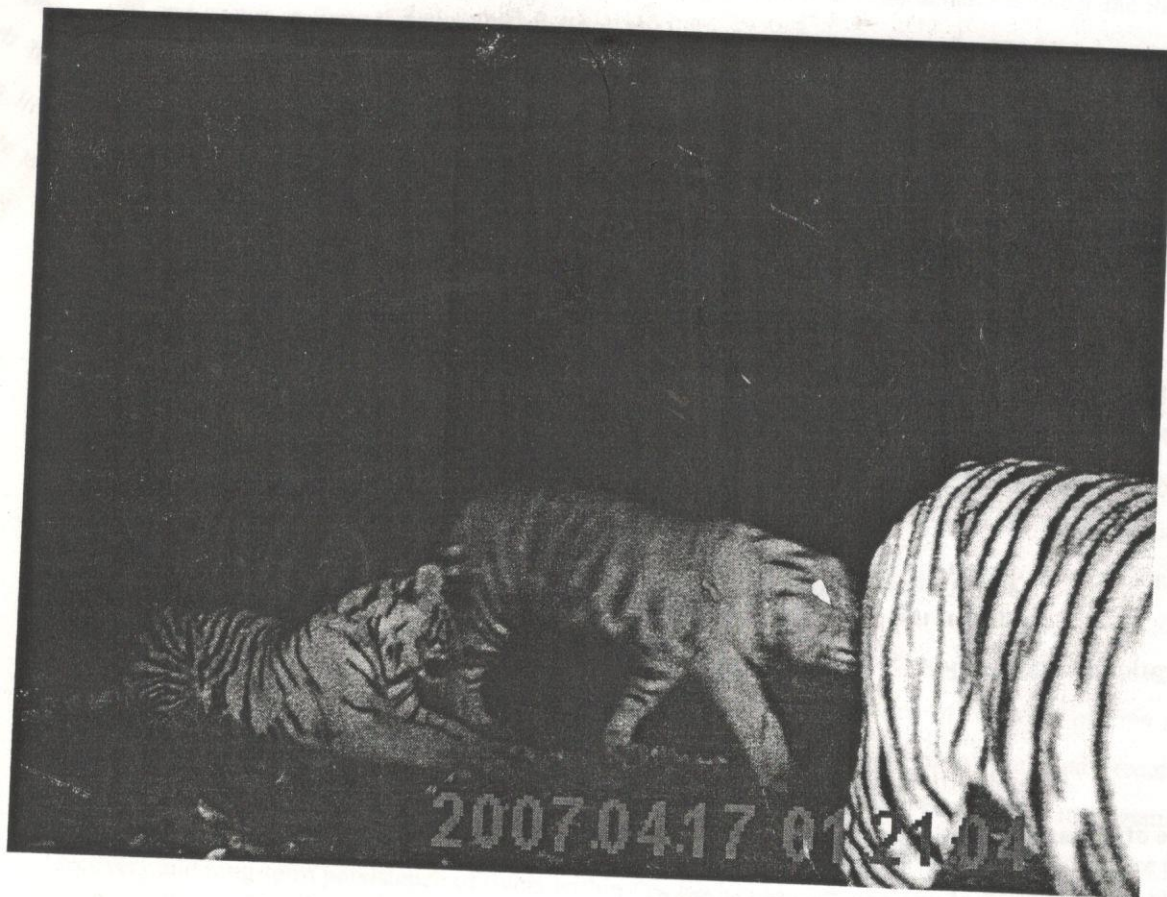


Project proposal for a grant

“Estimation of abundance and spatial distribution of wild ungulate prey species and tiger during monsoon in Chilla range, Rajaji National Park, Uttarakhand, India.”



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1. Title of the project: "Estimation of abundance and spatial distribution of wild ungulate prey species and tiger during monsoon in Chilla range, Rajaji National Park, Uttarakhand, India."
2. Name of the investigators: Dr. Bivash Pandav
Dr. S. P. Goyal
Researcher: Abishek Harihar
3. Duration of the project: Three months
4. Date of initiation of project: July 2007
Date of completion of project: September 2007
5. Study area: Rajaji National Park, Uttarakhand.

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Introduction

Long term conservation of tigers (*Panthera tigris*) in a human dominated landscape requires reliable quantitative information on existing populations, opportunities for dispersal and connectivity between populations. Human disturbance has taken a toll on many habitats that are very conducive for wildlife. One of the major concerns for conservationists regarding human related disturbance is whether it will affect the few remaining undisturbed natural areas of this country. According to Johnsingh et al., (2004) almost the entire stretch of tiger habitat in Uttarakhand is under the Shivalik tract and occurs in three tiger habitat blocks (THB). These include the forests stretching between, the Simbalbara Wildlife Sanctuary (Himachal Pradesh) to the west bank of the Ganges (THB I), the east bank of the Ganges and west bank of the Gola river (THB II) and east bank of Gola river to Sharada river (THB III). Covering nearly 6500km² this landscape can potentially support a minimum 150 adult tigers, given adequate protection (Johnsingh 2006). However, the protected areas of Rajaji National Park (RNP) and Corbett Tiger Reserve (CTR) constitute only about 30% of this landscape. *Gujjars*, a pastoralist community inhabit many areas of the Shivaliks. With their large holdings of Buffalos (*Bubalis bubalis*), intensive grazing, lopping and firewood extraction, a lack of sustainable regeneration and proliferation in weeds (Edgaonkar 1995) has led to habitat degradation. Until recently the *Gujjars* inhabited many parts of the RNP. Following a relocation program initiated by the Uttarakhand Forest Department in 2003 much of the occupied areas were made free of human infringement. The conservation efforts of the government of Uttarakhand continue to give a glimmer of hope for the long-term persistence of tigers (Johnsingh et al., 2004; Harihar 2005; Kurien 2005; Harihar et al., 2006; Johnsingh 2006). Of the nine forest ranges of the RNP, studies in the Chilla range (Harihar 2005; Kurien 2005; Harihar et al., 2006) indicate promising signs of recovery of prey and tiger populations following the relocation programme. Long term monitoring of prey and predators will help in understand their population dynamics (Karanth et al. 2006) and response to management interventions. We feel that this critical information should be available to managers so as to ensure the recovery and long-term persistence of tigers within this landscape.

Establishment of base line information:

Following the relocation of *Gujjar* settlements from the Chilla range of Rajaji National Park signs of increased animal use were noted (Pandav et al., 2004). Harihar (2005) and Kurien (2005) then established baseline information on prey and tiger densities and occurrence patterns of tigers and leopards in the Chilla range of RNP under the study titled "Response of tiger population to habitat, wild ungulate prey and human disturbance in Rajaji National Park, Uttarakhand, India". Harihar et al., (2006) then documented changes in prey and tiger population since the established baseline and


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emphasized on the need to monitor this recovering population of tigers across seasons and over the years to better aid in our understanding of tiger population dynamics.

Therefore, we studied,

1. Occurrence patterns of tigers and leopards assessed based on sign encounter surveys carried out along dry stream beds (*Raus*).
 2. Wild prey (Sambar, Chital, Nilgai and Wild Pig) densities estimated using line transects in conjunction with distance sampling methods
 3. Density of tigers estimated using photographic capture-recapture sampling and
 4. Food habits of tigers and leopards assessed from field collected scats
- Data were collected on the above across the three seasons viz., post monsoon, winter and summer from October 2006 to June 2007).

Table 1. Summary of objectives, field methods and analytical methods.

Objective	Field methods	Analytical methods
Occurrence patterns of tigers and leopards	Sign encounter surveys along stream beds	Hierarchical cluster analysis; (SPSS, Chicago, IL, USA)
Prey densities across RNP	Line transects (12 spatial replicates)	Distance analysis; Distance 4.1 Release 2 (Thomas et al. 2004)
Density of tigers across RNP	Camera trapping (40 trap sites)	Capture recapture; CAPTURE (Rexstad and Burnham 1991)
Food habits of tigers and leopards	Collection of scat samples from field	Percent occurrence and Biomass off take of prey species

Continuing the monitoring process

Following the range wise relocation programme initiated by the Uttarakhand Forest Department in 2003, Chilla range of RNP has provided us an opportunity to document changes in prey-predator populations following relocation of human settlements (Pandav et al. 2004; Harihar 2005; Kurien 2005; Harihar et al. 2006). The area with its high-density prey population and breeding

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tigers has the potential to support a higher density of tigers (Harihar 2005; Harihar et al. 2006). As high prey biomass correlates to higher chances of persistence of predator populations (Carbone and Gittleman 2002), such areas will have to be protected so as to ensure the long-term survival of medium to large carnivores. Kurien (2005) indicated that prey distribution was influenced by anthropogenic pressures, while Harihar (2005) and Harihar et al., (2006) report that the Chilla range of RNP harbour high prey densities (~90 individual prey species per km²) and predict higher tiger densities following the minimising of anthropogenic influence. Based on the results presented in Harihar et al., (2006) and photographic captures acquired during this study it is evident that the population of tigers in Chilla range of RNP seems to be on the increase thus reiterating the need to continually monitor this population of tigers.

As documented by Harihar et al. (2006), season influences population dynamics of prey and predators. The systematic monitoring protocol established here across the three seasons post monsoon (October 2006), winter (January 2007) and summer (April 2007) aimed to assess changes in prey and predator populations. Results of the current study showed that prey densities varied across the three sampled seasons, from ~50 individuals per km² (post monsoon) to 80 individuals per km² (summer) within Chilla range of RNP, while adult tiger densities did not vary significantly across the seasons (~3 individuals per 100km²). However, individual turnover was noticed with only two individual tigers being common to all the three sampled seasons. It was also noticed that capture probabilities varied across the three seasons, indicating increased tiger movement during winters within the Chilla range of RNP.

A need for project grant

As seasons seem to have a marked influence on the prey and predator populations it is proposed that sampling be carried out during the Monsoons (July 2007 and August 2007) to get complete insight across all seasons. During this period it is proposed that prey and predator densities will be computed for the study area. The 12 delineated line transects will be sampled three times each and phase wise (2 phases) camera trapping will be carried out in the 40 selected trapping locations for 15 days each during the sampling period. Scat samples will also be collected to assess food habits, while an attempt (weather permitting) will be made to carry out sign surveys to determine the occurrence patterns of tigers and leopards. Data collected during this period would enable us to design monitoring protocols for prey and predators in RNP for long term monitoring. Therefore, we visualise a need for a grant of Rs. 2,00,000 (Two Lakh Rupees) to meet the expenditures during collection of data during the monsoons (July 2007 – September 2007).


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Expected outcome

A report indicating spatial distribution and relative abundance of prey species and tiger during the monsoon period for Chilla range, RNP, Uttarakhand, India will be submitted.

Estimated expenditure:

Estimated expenditure for undertaking data collection during monsoon period is follows:

S No	Heads	Proposed Grant		
		Amount	Amount US\$*	Amount CHF*
1	Camera trap equipment, film rolls and cells	1,00,000	2517	3059
2	Wages for 2 field assistants @ 3000 per month for 2 months	25,000	629	765
3	Vehicle hire	25,000	629	765
4	POL and Maintenance	25,000	629	765
5	Miscellaneous	25,000	629	765
	Total	2,00,000	5034	6118

* As per present conversion rate.

Proposed plan of work

Objective		Jul-07	Aug-07	Sep-07
Field sampling	Occurrence patterns of tigers and leopards			
	Prey densities across RNP			
	Density of tigers across RNP			
	Food habits of tigers and leopards			
Analysis and Report writing				


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